CLAIMS

What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. A method of transmitting in an optical communication channel, comprising the acts of:

providing a first optical signal having a first center wavelength;

providing a second optical signal having a second center wavelength;

modulating the first and second optical signals by an information signal; and

propagating the first and second modulated optical signals in the optical communications channel;

wherein the phase of the information carried by the first optical signal is shifted relative to the phase of the information carried by the second optical signal.

2. The method of Claim 1, wherein the channel is a span of optical fiber.

3. The method of Claim 1, wherein the phase is shifted at a transmitter or a repeater coupled to the channel.

4. The method of Claim 1, wherein the shift is a predetermined delay sufficient to suppress composite second order distortion in the channel.

5. The method of Claim 4, wherein the shift is in the range of about 0.25 to 4 ns.

6. The method of Claim 1, wherein the shift is a predetermined delay sufficient to compensate for dispersion in the optical communications channel.

7. The method of Claim 6, wherein the shift is a predetermined delay sufficient to minimize CNR degradation in the channel.

8. The method of Claim 1, further comprising the acts of:

providing a third optical signal having a third center wavelength;

modulating the third optical signal by the information signal; and

propagating the third modulated optical signal in the optical communications channel;

wherein the phase of the information carried by the third optical signal is shifted relative to the phase of the information carried by the first and second optical signals.

9. The method of Claim 1, wherein the shift is provided by an optical modulator in combination with a plurality of wavelength division multiplexers outputting the first and second optical signals.

10. The method of Claim 1, further comprising the act of determining an amount of the shift as a function of the length of the optical communications channel and the wavelengths of the optical signals.

11. The method of Claim 1, wherein the first optical signal has a shorter wavelength than the second optical signal.

12. Apparatus for transmitting in an optical communications channel, comprising:

a source of a first optical signal having a first center wavelength;

a source of a second optical signal having a second center wavelength;

a source of an information signal coupled to modulate the first and second optical signals, wherein the modulated first and second optical signals are coupled to the optical communications channel; and

a delay device coupled to delay a phase of the first optical signal relative to the phase of the second optical signal.

13. The apparatus of Claim 12, wherein the channel includes a span of optical fiber.

14. The apparatus of Claim 12, wherein the apparatus is part of a transmitter or repeater coupled to the channel.

15. The apparatus of Claim 12, wherein the delay device provides sufficient delay to suppress composite second order distortion in the channel.

16. The apparatus of Claim 12, wherein the delay device provides delay in the range of about 0.25 to 4 ns.

17. The apparatus of Claim 12, wherein the delay device includes one of an optical delay element or a radio frequency delay element.

18. The apparatus of Claim 17, wherein the optical delay element is selected from a group consisting of a length of optical transmission media, a chirp grating, a length of dispersion compensation optical fiber, and a length of optical fiber with either high positive or high negative dispersion.

19. The apparatus of Claim 12, wherein the delay device comprises a first wavelength division multiplexer coupled to a first end of a length of optical transmission media, and a second wavelength division multiplexer coupled to a second end of the length of optical transmission media.

20. The apparatus of Claim 17, wherein the optical delay element is coupled between the source of the first optical signal and the channel.

21. The apparatus of Claim 17, wherein the radio frequency delay element is coupled between the source of the information signal and the source of the first optical signal.

22. The apparatus of Claim 12, wherein the delay is provided by an optical modulator in combination with a plurality of wavelength division multiplexers outputting the first and second optical signals.

23. The apparatus of Claim 12, wherein an amount of the delay is a function of the length of the optical communications channel and the wavelengths of the optical signals.

24. The apparatus of Claim 12, wherein the first optical signal has a shorter wavelength than the second optical signal.

25. The apparatus of Claim 12, further comprising

a first wavelength division multiplexer coupled to the sources of the first and second optical signals; and

a modulator coupled to receive the information signal and thereby to modulate signals from the first wavelength division multiplexer;

wherein the delay device includes:

a second wavelength multiplexer coupled to an output port of the modulator; and

a third wavelength division multiplexer coupled to receive signals output from the second wavelength division multiplexer.

26. The apparatus of Claim 17, wherein the optical delay element is coupled between the channel and the source of the first optical signal.

27. The apparatus of Claim 12, further comprising a modulator coupled to receive the information signal, thereby to modulate the optical signals, and wherein the RF phase shift device comprises a plurality of wavelength division multiplexers coupled to an output port of the modulator.

28. The apparatus of Claim 12, wherein the delay device provides sufficient delay to minimize CNR degradation in the channel.